5.0 DATA VALIDATION AND USABILITY

Implementation of data validation helps to ensure that the project data are evaluated in a consistent and objective manner. These requirements are defined for field sampling and field measurement activities, as well as for data generated by the off-site laboratory in a manner consistent with U.S. EPA Region 9 guidelines (U.S. EPA, 2001c), which provides a graded approach to data review based on the intended use of the data collected for Superfund.

5.1 REVIEW OF FIELD MONITORING DATA

Field monitoring provides time critical measurements of environmental samples for site management and operation decisions. Data measured by field instruments will be recorded on Daily Field Records (DFRs), laptops, and/or on required field forms. Examples of field documentation forms are included in the sampling SOPs. Units of measure for field monitoring equipment are provided in the respective SOP. Field data will be reviewed by the Field Supervisor to evaluate completeness of the field records and appropriateness of the field methods employed.

Field data to be input into the project database includes general water quality parameters, surface water flow readings, sampling coordinates, and weather station data. All field records will be retained in the project files. Figure 7 summarizes the process for completing field data reviews.

5.2 DATA VERIFICATION AND VALIDATION REQUIREMENTS FOR LABORATORY DATA

Each level of the data review process is designed to evaluate a given data set for completeness, compliance, and to identify biases inherent to the data affecting data quality, and consequently, such data may be assigned qualifiers, or data flags. Figure 8 depicts the process for completing laboratory data verification and data validation.

Prior to release of the final laboratory data reports, the respective analytical laboratory performs review of the data records to evaluate compliance with the approved analytical methods and with laboratory SOPs. The laboratory data quality review includes a review of precision and accuracy results and ensures complete reporting and compliance with the analytical method and quality control requirements.

Data verification refers to the routine checks the Project QA Manager conducts (or assigns to a qualified designee) to ensure that the planned analysis has been completed in accordance with accompanying chains of custody and that laboratory deliverables are complete and available to proceed with data validation, but also routine assessment of the results provided by the

analytical laboratory, such as analytical methods employed, units of reporting and general narrative to ensure data deliverables are consistent with this RI/FS QAPP. Data verification is further detailed in Section 5.2.1. Data validation refers to a formal evaluation of conformance to the RI/FS DQIs and the assignment of data validation qualifiers, if warranted, to address nonconformance or bias in the reported results. The laboratory will provide analytical results, laboratory QC results, and supporting documentation as directed on the accompanying COC, in both electronic and PDF formats. All laboratory data will undergo data validation using a tiered approach as described in Section 5.2.2. The laboratory will provide additional documentation as requested by the Project QA Manager, or designee, to facilitate data validation, or make corrections as necessary.

5.2.1 Data Verification

Data verification will be performed on 100% of the laboratory data and includes a review of proper sampling documentation, required laboratory documentation, data completeness, data representativeness, field QC sample performance, and the presence of any reported data quality issues, or any obvious errors in data reporting. Any identified errors will be referred back to the laboratory for correction, or to the data validator for further review. As depicted in Figure 8, once data verification is completed for the laboratory data and no corrections are deemed necessary, the data are provided to a third party data validator for validation.

5.2.2 Data Validation

Data validation will be conducted using a two-tiered approach. The first tier data validation (Level II), will be "limited" to evaluation of the reported QC results provided in the summary laboratory data report (Table 6) with respect to the project DQIs. The second tier data validation (Level IV) will require more extensive laboratory data packages (Table 6) and include the same data validation elements as Level II validation elements and also a more in-depth evaluation of instrument calibration records, laboratory performance criteria, and quantitative determinations using guidance from the National Functional Guidelines (U.S. EPA, 2014) and the QC criteria specified in the RI/FS QAPP. Sample sets to be designated for the Level II or Level IV data validation will be selected during sample collection activities by the Project QA Manager, or designee, such that larger sample sets or sample sets inclusive of field QC samples such as field blanks, field duplicates and project specific matrix spike samples are routinely selected. At a minimum, Level IV data validation will be completed for a minimum of 20 percent of the total data set. The remainder (approximately 80 percent) of the laboratory data will be subject to a Level II data validation. The QC elements to be reviewed during the Level II and Level IV data validation activities are detailed in Section 5.2.2.1 and summarized in Table 7.

The Project QA Manager is responsible for coordinating data validation activities with an independent data validation contractor to ensure completion of the final data set. The output of data validation includes a final validation report describing the procedures used to validate the data, the rationale for any qualified results, and a summary of qualified data as described in Section 5.4. Final data, including all qualified data, are subsequently added to the project database upon completion of data validation and evaluation of the data quality control results as depicted in Figure 8.

5.2.2.1 Level II Data Validation

A maximum of 80 percent of the laboratory analytical results will be subject to Level II data validation. A computer-aided module will be used to assist in the validation of the standard laboratory data reports. The review elements of the Level II validation will include, but is not limited to the following:

1. completeness of requested laboratory analysis compared to chains of custody;
2. correctness of laboratory analysis methods utilized compared to chains of custody;
3. performance of testing within method holding times specified in the RI/FS QAPP;
4. evaluation of laboratory and field blank results compared to RI/FS QAPP criteria;
5. evaluation of laboratory and field duplicate results compared to RI/FS QAPP criteria;
6. evaluation of laboratory matrix spike results compared to RI/FS QAPP criteria;
7. evaluation of laboratory control standard results compared to RI/FS QAPP criteria;
8. occurrence of elevated parameter reporting limits compared to RI/FS QAPP criteria; and
9. data qualification, if results are determined to be outside the criteria listed above, following the principles of the National Functional Guidelines (U.S. EPA, 2014) for evaluation.

Following Level II validation, a written report summarizing the effort and any qualified data will be prepared along with an electronic deliverable containing the finalized data results and any accompanying validation qualifiers for upload to the project database. Data qualification is further summarized in Section 5.3, and data validation qualifiers which may be used to qualify results are provided in Table 5.

5.2.2.2 Level IV Data Validation

A minimum of 20 percent of the laboratory analytical results will be subject to Level IV data validation as discussed in Section 5.2.2. The Level IV data validation effort will encompass all of the data review elements listed in Section 5.2.2.1 for Level II data validation as well as the additional review elements listed in this section. Level IV data validation will be conducted in a manner consistent with the National Functional Guidelines (U.S. EPA, 2014), applicable to metals and other general chemistry parameters, and include a detailed review of laboratory results, method performance and quantitation procedures. The additional review elements of the Level IV validation will include, but is not limited to the following:

- assessment of instrument calibration results compared to method criteria;
- assessment of sample performance standards compared to RI/FS QAPP criteria;
- evaluation of sample preparation logs, instrument run logs, and standard preparation;
- comparison of raw data and calculations to reported sample concentrations; and
- data qualification, if results are determined to be outside the criteria listed above, following the principles of the National Functional Guidelines (U.S. EPA, 2014) for evaluation.

Following Level IV validation, a detailed summary of the methods, results, and any resulting qualified data will be included in the validation report. Reports for Level IV validation will provide details of the data validation effort, including the calculations and pertinent laboratory records to support the conclusions and judgements made in assessing the data quality and accompanied by a tabular summary of the qualified data formatted for upload to the project database. Data qualification is further summarized in Section 5.3, and data validation qualifiers which may be used to qualify results are provided in Table 5.

If Level IV data validation activities indicate a systematic problem or repeated non-compliance with the DQIs, the frequency of Level IV data validation will be increased to adequately determine the level of impact associated with the non-compliance. The increased validation effort may also be used to determine any root cause and necessary corrective action with respect to sampling or analysis.

5.2.2.3 Data Validation Report Schedule

Data validation reports will be prepared after each respective data set is validated for both Level II and Level IV validation efforts. Data validation reports are maintained with the project files and copies provided annually to the U.S. EPA along with an EDD and summary of validation

findings. Data validation reports will be used to prepare an overall summary of the data quality control results as described in Section 5.4.

5.3 DATA QUALIFIERS

The laboratory assigns data flags to the reported analytical results, when necessary, to indicate potential impacts to data usability of an individual result or a set of results. Laboratory data flags are specific to a given laboratory, and refer to QC exceedances based on method requirements, in-house QC limits, and accumulated laboratory experience. More than one qualifier may be used to indicate multiple conditions or situations that apply to any individual result, or a set of affected sample results. All laboratory data flags assigned by the analytical laboratory are retained in the project database as part of the complete data record. Laboratory data flags, for each respective laboratory, are documented in the respective laboratory data report and maintained in the project database.

The data validation procedures are designed to review a given data set and identify biases inherent to the data and determine its usefulness. Data validation procedures, which rely on evaluation criteria defined by the National Functional Guidelines (U.S. EPA, 2014) are used to reconcile any aberrant laboratory quality control results and assigned laboratory data flags resulting in a single set of defined data qualifiers (Table 5). Data validation qualifiers are applied to those sample results that fall outside of specified tolerance limits. Data validation qualifiers will indicate if results are considered anomalous, estimated, or rejected. Only rejected data are considered unusable for decision-making purposes; however, other qualified data may require further validation. Qualifiers to be applied during data validation are based on those defined in the National Functional Guidelines and are provided in Table 5. All data, including qualified data are retained in the project database and provided annually to the U.S. EPA in an electronic format. For the RI/FS samples, any qualified data records in the project database will be accompanied by a secondary code denoting the reason for data qualification. These “reason codes” are defined in Table 5.

5.4 QUALITY CONTROL SUMMARY REPORTS

All data quality issues concerning field quality control measures, laboratory analysis, data validation, and data reporting will be reviewed by the Project QA Manager on an ongoing basis and results summarized in a data Quality Control Summary Report (QCSR) for inclusion in the annual summary report, or as complete validation results are available for a given sampling “event”, or sampling program. In special circumstances, such as data collection involving judgmental sampling, the timing for completing the data quality summary review will be accelerated such that preliminary reporting of judgmental sampling data occurs soon after data become available. The QCSR will include an evaluation of QA/QC measures and a summary of

data quality results in terms of the DQIs (precision, accuracy, representativeness, comparability and completeness). Specific issues to be reviewed include conformance with data quality requirements and overall data completeness.

The QCSR will provide an overall data quality evaluation conducted to determine whether data generated are consistent with the sampling and analysis objectives consistent with U.S. EPA guidance for data verification and data validation processes (U.S. EPA, 2002b). The QCSR will provide a summary of the qualified data and statement of availability or limitations in data usefulness for project evaluations and decision-making. The data may be further limited or excluded based on an assessment of the usability of the data for the intended end use. The data quality evaluation will support the conclusion if data are categorized as screening level (e.g., potentially useful for qualitative evaluations), such as those derived by field methods, or definitive data (e.g., potentially useful for quantitative evaluations) including most lab generated data. Definitive data are subsequently defined as fully usable, usable as qualified, or rejected. Rejected data will not be considered useful for evaluating the DQOs.

At a minimum, the QCSR will include the following information:

- Description of the QA process
- List of applicable samples, lab references, sample location and associated analysis
- Level of data validation completed for each lab report
- Data validation qualifier and reason code definitions that link results to a specific qualifier logic
- Data validation findings for each group of parameters (e.g., metals, anions, etc.)
- Summary of qualified data
- Summary of field duplicate precision
- Summary of field blank results
- Evaluation of PARRCS parameters
- Assessment of data limitations
- Copies of laboratory and data validation reports

The QCSR will address media-specific results and will be included in the Annual Summary Reports or other interim RI deliverables as warranted.